MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER1, 2018/2019

PTM0145 – TRIGONOMETRY

(Foundation in Information Technology / Life Sciences)

15 OCTOBER 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Attempt **ALL FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **ALL FIVE** questions.

Question 1 [10 marks]

a. Simplify and express the answer in standard form $a + bi$.

i. $\dfrac{2-4i}{(3-i)^2}$ (3 marks)

ii. $\sqrt{-9}(3i^3-4i^2+2i)^2$ (3 marks)

b. Given $z=3-4i$. Find the polar form of z^6. (4 marks)

Question 2 [10 marks]

a. Given the vertex of the parabola is (3, 6) and the directrix line is 2 units on the right of the vertex.

i. Sketch the graph of the parabola based on the above information and hence identify the axis of symmetry, focus point and lactus rectum. (3 marks)

ii. Find the equation of the parabola and write the answer in $x=ay^2+by+c$. (3 marks)

b. Sketch the ellipse given $\dfrac{(x+4)^2}{4}+\dfrac{(y-3)^2}{9}=1$. Identify the center, vertices and focus points. (4 marks)

Question 3 [10 marks]

Given the matrices $P=\begin{bmatrix}1 & 2 & 3\\ 0 & -4 & 1\\ 0 & 3 & -1\end{bmatrix}$ and $Q=\begin{bmatrix}6 & -2 & 2\\ 0 & 4 & -6\\ 2 & 0 & 8\end{bmatrix}$.

Find

i. $3P^T-\dfrac{1}{2}Q$ (2 marks)

ii. the inverse of matrix P. (5 marks)

iii. the value of x, y and z given $\begin{bmatrix}1 & 2 & 3\\ 0 & -4 & 1\\ 0 & 3 & -1\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}2\\ -10\\ 8\end{bmatrix}$. (3 marks)

(hint: use the answer in part ii)

Continued...

Question 4 [10 marks]

a. Sketch the graph of $y = -2\cos(2x + \pi)$ for $-\frac{\pi}{2} \le x \le \frac{3\pi}{2}$.

Identify the x- intercepts. (5 marks)

b. Solve the triangle PQR given p = 10cm, q = 7cm and $\angle PQR = 35^\circ$ and find the area of the triangle. (5 marks)

Question 5 [10 marks]

a. Solve the equation for $0^\circ \le x \le 360^\circ$.

i. $\sqrt{2}\csc\left(\frac{x}{6}\right) - 2 = 0$ (3 marks)

ii. $\cos 2x + \cos x = 0$ (4 marks)

b. Find the exact value of $\cot 2\theta$ given $\sin\theta = -\frac{1}{3}$, and θ is in quadrant 3.

Do not use a calculator. (3 marks)

End of Page

APPENDIX

Trigonometry Identities

$$\cos^2 A + \sin^2 A = 1 \qquad \sec^2 A = 1 + \tan^2 A \qquad \csc^2 A = 1 + \cot^2 A$$

$$\cos(A+B) = \cos A\cos B - \sin A\sin B$$
$$\cos(A-B) = \cos A\cos B + \sin A\sin B$$
$$\sin(A+B) = \sin A\cos B + \cos A\sin B$$
$$\sin(A-B) = \sin A\cos B - \cos A\sin B$$
$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$$
$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$$

$$\cos 2A = \cos^2 A - \sin^2 A$$
$$= 2\cos^2 A - 1 = 1 - 2\sin^2 A$$
$$\sin 2A = 2\sin A\cos A$$
$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$$

$$\sin A\cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$$
$$\cos A\cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$$
$$\sin A\sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$$

$$\sin A + \sin B = 2\sin\frac{A+B}{2}\cos\frac{A-B}{2} \qquad \sin A - \sin B = 2\cos\frac{A+B}{2}\sin\frac{A-B}{2}$$

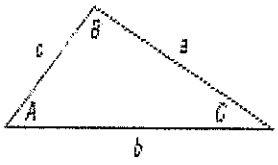
$$\cos A + \cos B = 2\cos\frac{A+B}{2}\cos\frac{A-B}{2} \qquad \cos A - \cos B = -2\sin\frac{A+B}{2}\sin\frac{A-B}{2}$$

$$\sin^2\frac{A}{2} = \frac{1-\cos A}{2} \qquad \cos^2\frac{A}{2} = \frac{1+\cos A}{2} \qquad \tan^2\frac{A}{2} = \frac{1-\cos A}{1+\cos A}$$

$$\sin\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{2}} \qquad \cos\frac{A}{2} = \pm\sqrt{\frac{1+\cos A}{2}} \qquad \tan\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{1+\cos A}}$$

$$\tan\frac{A}{2} = \frac{1-\cos A}{\sin A} = \frac{\sin A}{1+\cos A}$$

Triangles



Law of Sines:

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Law of Cosines:

$$c^2 = a^2 + b^2 - 2ab\cos C$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$a^2 = b^2 + c^2 - 2bc\cos A$$

Area of a Triangle: $A = \frac{1}{2}ab\sin C = \frac{1}{2}bc\sin A = \frac{1}{2}ac\sin B$

$$A = \sqrt{s(s-a)(s-b)(s-c)} \quad \text{where} \quad s = \frac{1}{2}(a+b+c)$$

Polar Coordinates

$$x = r\cos\theta$$
$$y = r\sin\theta$$
$$r = \sqrt{x^2 + y^2}$$
$$\tan\theta = \frac{y}{x}$$